AD-B190 784 TEST OF T14 FEED MECHANISMS FOR 20MM GUN AN-M2(U) ARMY AIR FORCES WASHINGTON DC 23 NOV 43 XA-AAF 1/1

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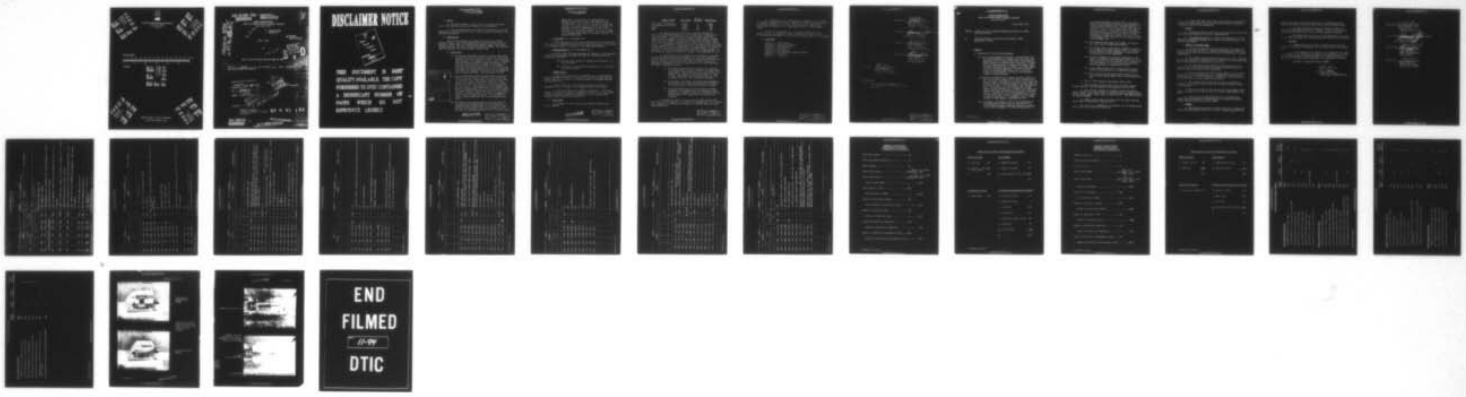

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PROOF DEPARTMENT
ARMY AIR FORCES PROVING GROUND COMMAND
EGLIN FIELD, FLORIDA

1. APG File 2641
23 Nov 43

FINAL REPORT

ON

TEST OF T14 FEED MECHANISMS FOR 20MM GUN AN-M2

Serial No.: 2-43-91 No. of Pages: 5 Date: 23 November 1943
AAF Board Project No. (M-5) 23

CLASSIFICATION CANCELED OR
CHANGED TO
AUTHORITY: 1st Ind Eglin 12/13
BY
NAME AND GRADE
DATE 12/18/46

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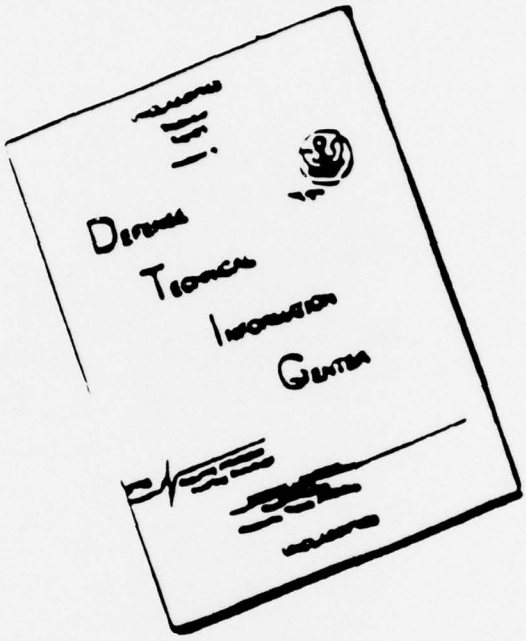

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1. OBJECT:

a. The primary purpose of this test is to conduct air firing tests of the T14 feed mechanism as a basis for standardization.

b. The secondary purpose is to obtain data relative to the life expectancy of 20mm gun components and to obtain a general appraisal of the P-70 gun installation.

2. INTRODUCTION:

The test was requested in a letter from the Army Air Forces Materiel Command, Wright Field, Dayton, Ohio, dated 8 September 1943, to Commanding General, Army Air Forces Proving Ground Command, Eglin Field, Florida, subject: "T14 Feed Mechanisms for 20mm Gun AN-M2." The test was begun 18 September 1943 and concluded 2 November 1943.

a. Description.

(1) The T14 feed mechanism consists of a spring driven pair of sprockets mounted on a central shaft which forces the ammunition into the throat of the feeder, a free-wheeling drive mounted on the forward end of the shaft, a slipping clutch of improved design to prevent overwinding, link stripping cams located in the throat of the feeder, operating levers permitting winding of the feeder during both recoil and counter-recoil motions, and a supporting framework which attaches to the gun in the same manner as does the AN-M1 mechanism. (See Inclosures 7 and 8.)

(2) The feed mechanism may be initially wound at either the front or rear of the shaft, but it may be unwound only at the rear point. When wound at the front of the shaft, the slipping clutch is interposed between the driven shaft and the spring so that it is impossible to exert too much tension. When wound at the rear, however, the slipping clutch is short circuited and the operator will have to be experienced enough to know when he has applied the proper tension. The rear end of the shaft comprises a part of a positive clutch and in order to engage the clutch before the shaft is turned, it is necessary to press it inward toward the feed mechanism approximately 3/16".

(3) The design of the link is based on the requirement for stripping rounds directly from the link without any relative axial movement between the link and the round. To suit this requirement, the link is equipped with an extended ear protruding from each side of the double loop,

which, when passing through the feed mechanism, is guided through stripping cams. The ammunition belt is assembled so that the top of the link is 3.80" from the base of the round. For the left or right-hand feed mechanism the belt is assembled so that the closed portion of the link enters at the top side of the feed mechanism, the single loop leading. No round is placed in the leading single loop, but a round is placed in the trailing double loop.

3. CONCLUSION.--It is concluded that:

The T14 feed mechanisms for 20mm cannon AN-M2 (after modifications were made by the Oldsmobile representative, refer to paragraph 6 c) operated in an excellent manner in comparison to the AN-M1 feed mechanism.

4. RECOMMENDATIONS.--It is recommended that:

a. The subject T14 feed mechanisms, as modified, be made standard equipment for 20mm cannon installations after the following additional changes have been made:

(1) The door cover bracket be fastened more securely to the feed mechanism.

(2) A thumb type spring latch be installed on the outside of the operating yoke.

5. RECORD OF TEST:

a. The test was conducted in accordance with the test program, which is attached as Inclosure 1, except that only about fifteen hundred (1500) rounds of A.P. ammunition were used, while the remainder expended was ball ammunition.

b. The airplane was flown under the various conditions as described in the test program with no apparent effect upon feeding.

c. Gun history charts are attached as Inclosure 2. The firing summary of the total missions are attached as Inclosure 3. The scores for the ground gunnery are attached as Inclosure 4. The component parts breakage record is attached as Inclosure 6.

6. DISCUSSION:

a. A summary of feeder stoppages for feeders tested at this station follows:

Type of Feeder	Rds. Fired	No. of Stoppages	Rds/Stoppage
T-14 (final modification)	12,499	6	2,083
T-14 (before modification)	2,393	5	478
AN-M1	33,732	43	784
M1E1	7,944	16	496

b. Less time is required to train personnel properly to maintain the T14 feed mechanisms for 20mm cannon than is required for the AN-M1 feeders. The T14 feeders are open and expose all of the operating parts; breakages can be seen easily without taking the feeder apart. This type feeder will require less maintenance in actual field conditions. No oiling is necessary and the parts do not burr as easily as in the AN-M1 feeders. Burrs often make it necessary to take the AN-M1 feeders apart and stone the burred parts. The T14 feed is more easily and quickly taken apart and reassembled than the AN-M1 feeder. It is not necessary to take the T14 feeder apart as often as the AN-M1 feeder. The T14 feeders are smaller and easier to install. (See Inclosures 7 and 8.)

c. Upon arrival of the airplane at this station, the guns were checked and cleaned and five (5) missions were fired with rather poor results. After the first two (2) missions, the link ejection chutes were properly aligned to prevent link jams. After the fifth mission, the Oldsmobile representative took the feeders apart for a minute inspection and made the following changes:

(1) The original free-wheeling drive units were replaced by new ones having the inner surface of the deep pocket shot-blasted. The shot-blasting pits the surface of the pocket, thus allowing the lubricant between the free-wheeling spring and pocket to escape during the drive portion of its cycle. This eliminates slippage.

(2) The original link ejection deflectors were replaced by new ones designed to give better control and guidance to the link as it is being stripped from the round.

(3) It was discovered that the link had been incorrectly positioned on the round due to misinformation. This mistake was corrected by placing the round 2-9/32" from the rear edge of the double loop to the base of the cartridge.

d. During the course of the test, one (1) door cover bracket broke off from the feeder due to a poor job of spot-welding. This condition can be corrected by fastening this bracket by a heavier weld or a rivet. (See Inclosure 5.)

e. A thumb type spring latch should be installed on the outside of the yoke to prevent the operating lever of the feeder from coming out of the yoke and causing a gun stoppage. This stoppage occurred four (4) times on one (1) feeder, due to a weak plunger spring unlatching while firing.

f. In this installation the link ejection chutes were not aligned properly and caused link jams on several of the first missions. This condition was corrected by aligning these chutes properly with the guns.

7. INCLOSURES:

Inclosure 1 - Test Program.
Inclosure 2 - Gun History Charts.
Inclosure 3 - Firing Summary.
Inclosure 4 - Gun Scores.
Inclosure 5 - Photographs.
Inclosure 6 - Component Parts Breakage Record.
Inclosure 7 - Photograph.
Inclosure 8 - Photograph.

Prepared by: J W Waters
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Concurred in:
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1st Lt., Air Corps,
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Serial No.: 2-43-91
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PROOF DEPARTMENT
ARMY AIR FORCES PROVING GROUND COMMAND
EGLIN FIELD, FLORIDA

24 September 1943

SUBJECT: Program for Test of T14 Feed Mechanisms for 20mm Gun AN-M4. (S.T. No. 2-43-91)

TO: Commanding Officer, 1st Proving Ground Group, AAFPGC, Eglin Field, Florida.

1. GENERAL:

a. Description of the T14 Feed Mechanism.

(1) The T14 feed mechanism consists of a spring driven pair of sprockets mounted on a central shaft which forces the ammunition into the throat of the feed, a free-wheeling drive mounted on the forward end of the shaft, a slipping clutch of improved design to prevent overwinding, link stripping cams located in the throat of the feed, operating levers permitting winding of the feed during both recoil and counter-recoil motions, and a supporting framework which attaches to the gun in the same manner as does the AN-M1 mechanism.

(2) The feed mechanism may be initially wound at either the front or rear of the shaft, but it may be unwound only at the rear point. When wound at the front of the shaft, the slipping clutch is interposed between the driven shaft and the spring so that it is impossible to exert too much tension. When wound at the rear, however, the slipping clutch is short circuited and the operator will have to be experienced enough to know when he has applied the proper tension. The rear end of the shaft comprises a part of a positive clutch and in order to engage the clutch before the shaft is turned, it is necessary to press it inward towards the feed mechanism approximately 3/16".

(3) The design of the link is based on the requirement for stripping rounds directly from the link without any relative axial movement between the link and the round. To suit this requirement, the link is equipped with an

Inclosure 1.

extended ear protruding from each side of the double loop, which when passing through the feed mechanism, is guided through stripping cams. The ammunition belt is assembled so that the top of the link is 3.80" from the base of the round. For the left or right hand feed mechanism the belt is assembled so that the closed portion of the link enters at the top side of the feed mechanism, the single loop leading. No round is placed in the leading single loop, but a round is placed in the trailing double loop.

(4) The mechanism weighs twelve (12) pounds, and occupies less space than the AN-M1 feed mechanism.

(5) The winding energy for the feed is transmitted from the gun by means of a bracket assembly which is attached to the gun receiver and which operates an engaging lever protruding from the feed mechanism.

(6) The feed is designed to operate on approximately 5/8" recoil. The design of the mechanism is such that in the event some of the original torque is lost, it cannot be regained, however, no torque will be lost unless the recoil drops below the required 5/8" travel.

(7) A last round retainer device is incorporated which is similar to that provided in the AN-M1 feed mechanism.

(8) Each front gun has two hundred (200) rounds and each rear gun three hundred (300) rounds of ammunition available.

b. This is a FIRST PRIORITY experimental service test.

c. Eight thousand (8,000) rounds of A.P. and eight thousand (8,000) rounds of ball 20mm ammunition are authorized for this test.

d. This test was requested in a letter from the AAF Materiel Command, Wright Field, Dayton, Ohio, to Commanding General, Army Air Forces Proving Ground Command, Eglin Field, Florida, subject: "T14 Feed Mechanisms for 20mm Gun AN-M2."

e. Captain John W. Waters is designated as the Machine Gun and Cannon Section Project Officer for this test.

f. 1st Lt. T. R. Yglesias is designated as the 1st Proving Ground Group, AAFPGC, Test Officer for this test.

g. At the conclusion of this test, which should be conducted for a period of fourteen (14) days, the subject airplane will be disposed of in accordance with existing regulations.

2. OBJECT:

a. The primary purpose of this test is to conduct air firing tests of the T14 feed mechanism as a basis for standardization.

b. The secondary purpose is to obtain data relative to the life expectancy of 20mm gun components and to obtain a general appraisal of the P-70 gun installation.

3. METHOD OF CONDUCTING TEST:

a. The four (4) guns will be fully loaded with A.P. ammunition and the airplane will be flown at a speed of two hundred forty (240) miles per hour and the guns will be fired out during level flight and at maximum accelerations.

b. The airplane will be flown as described in the above paragraph and the guns fired in the same manner but the guns will be fully loaded with A.P. and ball ammunition loaded one (1) to one (1).

c. The guns will be fully loaded with ball ammunition and the airplane will be flown as described in paragraph a and the guns will be fired out while the airplane is in steep glides.

d. The two (2) right guns will be fully loaded with ball ammunition while the two (2) left guns are fully loaded with A.P. ammunition. The airplane will be flown as described in paragraph a, and the guns will be fired out with a series of right and left banks.

e. The airplane will be flown with the guns fully loaded as described in paragraph d, and the guns will be fired out during a series of steep climbs.

f. The airplane will be flown and the guns fully loaded as described in paragraph d, and the guns will be fired out during severe pull-outs.

g. Any or all of the above missions will be repeated until malfunctions are reduced to a minimum and until at least four thousand (4,000) rounds are fired through each feeder.

4. RECORDS:

a. The armament member will load each gun so that a dummy round will be the third one from the end of the belt. A torque reading will be

taken at the start of the mission and also at the conclusion of each firing. Belts will be given the usual check for weak or binding links.

b. The armament member will keep gun histories showing the number of rounds fired, malfunctions, breakages, and hours of maintenance, paying particular attention to each and every component replacement.

c. Photographs will be taken by the Proof Department Photographer of the subject equipment and of any constructional failures that may occur.

5. REPORTS:

a. A daily progress report will be maintained by the Project Officer in the office of the Machine Gun and Cannon Section, Proof Department.

b. A final report will be prepared by the Project Officer, after a conference with all participating personnel, and submitted to the Chief of the Proof Department, through the Chiefs of the Testing Branch and Machine Gun and Cannon Section, immediately upon completion of the test.

By Command of Brigadier General GARDNER:

J. O. GUTHRIE,
Colonel, Air Corps,
Actg. Chief, Proof Department.

Prepared by: J. W Waters

J. W. WATERS,
Captain, Air Corps,
Project Officer.

Concurred in:

F. R. YGLESIAS,
1st Lt., Air Corps,
Group Test Officer.

Approved by:

W. A. SHEPPARD,
Major, Air Corps,
Chief, Machine Gun and
Cannon Section.

Approved by: J. O. Guthrie

J. O. GUTHRIE,
Colonel, Air Corps,
Chief, Testing Branch.

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GUN HISTORY RECORD

Airplane Type P-70 Airplane No. 39-736 S.T. # 2-43-91

Gun Type 20 MM Gun Serial No. 165610 Installation Left Outboard

Rounds Loaded	Rounds Fired	Total To Date	Date	Armors Initial	Type Amm. Lot. No.	Remarks; Give complete information, mission-malfunction, parts replaced, etc.
						Previous rounds fired - 530
225	225	225	9/18	RHB	AP	OK. Torque not checked.
300	5	230	9/22	RHB	Ball	Action home-no round in chamber-broken driving spring-guns cleaned-
(Link chutes aligned in Sub-Depot)						new type firing pins installed.
300	30	260	9/23	RHB	Ball	Feed run down-mount loose-torque before mission 275#, after, 100#
						(inch #)
300	145	405	9/24	RHB	AP&Ball	Feeder run down-round in chamber but projectile damaged enough to pre-
						vent bolt from going into battery position.
300	95	500	9/25	RHB	Ball	Feeder run down-failure to feed-torque before take-off 325#, after,
						75#. Feeders had new free-wheeling unit installed. Guns cleaned
						and checked.
25	25	525	10/1	RHB	Ball	OK. Boresight range-checked recoil.
300	226	751	10/2	RHB	Ball	M1 links in ammo. belt torque OK
300	294	1045	10/4	RHB	"	Link jam-round out of line in belt
300	300	1345	10/4	RHB	"	OK. Torque OK

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GUN HISTORY RECORD

Airplane Type P-70 Airplane No. 39-736 S. T. # 2-43-91

Gun Type 20 MM Gun Serial No. 165610 Installation Left Outboard

Rounds Loaded	Rounds Fired	Total To Date	Date	Armors Initial	Type Amm. Lot. No.	Remarks; Give complete information, mission-malfunction, parts replaced, etc.
300	300	1645	10/5	RHB	Ball	OK. Torque OK, guns cleaned and checked
300	300	1945	10/11	RHB	Ball	OK, Torque OK
300	300	2245	10/12	RHB	AP & Ball	OK. Torque OK, guns cleaned and checked, cracked breechblock lock replaced
300	300	2545	10/18	HFR	Ball	OK, Torque OK
300	300	2845	10/22	"	"	OK
300	45	2890	10/24	"	"	Separated belt (weak link)
300	136	3028	10/28	RHB	"	OK. Pilot stopped firing
300	5	3033	10/30	"	"	Link jam, bent prong on link
300	300	3333	10/30	"	"	OK
300	25	3358	10/30	"	"	Broken firing pin, broken firing pin parts, burred firing pin slot, bolt replaced.
300	300	3658	11/1	"	"	OK
300	300	3958	11/2	"	"	OK
300	300	4258	11/2	"	"	OK. Replaced gas cylinder vent plug

GUN HISTORY RECORD

Airplane Type P-70 Airplane No. 39-736 S.T. # 2-43-91

Gun Type 20 MM Gun Serial Number 165616 Installation Right Outboard

Rounds Fired	Rounds Fired	Total No. Rounds	Date	Armorer Initial	Type Ammo. Lot. No.	Remarks: Give complete information, explanation, parts replaced, etc.
						Previous rounds fired - 530
225	25	25	9/16	RHB	AP	Rounds out of line in belt
300	145	170	9/22	"	Ball	Link jam, link chute out of position. (Link chutes aligned in Sub-Depot) guns cleaned and checked. New type firing pins installed.
300	170	340	9/23	"	"	Insufficient recoil due to loose mount. Torque before mission 250#, after mission 150#.
300	300	640	9/24	"	AP&Ball	OK
300	25	665	9/25	"	Ball	Feeder run down, failure to feed. Torque before mission 325#, after mission 150#.
						Feeder had new free-wheeling unit installed and guns cleaned & checked.
25	25	690	10/1	"	"	OK, Boresight range. Recoil checked.
300	300	990	10/2	"	"	OK. Torque OK
300	300	1290	10/4	"	"	OK. Torque OK
300	300	1590	10/4	"	"	OK. Torque OK
300	50	1640	10/5	"	"	Link jam. Link chute bent and was straightened.
300	255	1895	10/11	"	"	Belt came apart inside ammunition can (weak link).
300	300	2195	10/12	"	AP&Ball	OK Torque OK, guns cleaned and checked, cracked breechblock lock replaced.

P-70 39-736 S.T. # 2-43-91

20 MM 165616 Right Outboard

300	300	2495	10/18	HFR	Ball	OK
300	118	2613	10/22	"	"	Failure to extract. Extractor spring broken and driving spring replaced.
300	300	2913	10/24	"	"	OK
300	138	3051	10/28	RHB	"	OK. Pilot stopped firing
300	300	3351	10/30	"	"	OK
300	300	3651	10/30	"	"	OK, replaced cracked breechblock lock, driving spring and rear buffer assembly. Retainer pin broken.
300	300	3951	10/30	"	"	OK
300	300	4251	11/1	"	"	OK
300	150	4401	11/2	"	"	Magazine slide securing arm screw broken
300	300	4701	11/2	"	"	OK, gas cylinder sleeve spring broken and replaced, installed new gas cylinder vent plug, changed burred ejector,

C O N F I D E N T I A L

GUN HISTORY RECORD

Airplane Type P-70 Airplane No. 39-736 S.T. # 2-43-91

Gun Type 20 MM Gun Serial Number 165612 Installation Right Inboard

Rounds Loaded	Rounds Fired	Total To Date	Date	Armorers Initial	Type Ammo. Lot. No.	Remarks: (Give complete information, mission-malfunction, parts replaced, etc.)
						Previous rounds fired - 730
155	53	53	9/18	RHB	AP	Light struck primer
200	45	98	9/22	"	Ball	Link jam. Ammo out of line in belt (link chutes aligned in Sub-Depot). Guns cleaned and checked. New type firing pins installed.
200	200	298	9/23	"	"	OK, torque before mission 325#, after mission 325#.
200	88	386	9/24	"	AP&Ball	Weak links, broken belt, torque OK
200	200	586	9/25	"	Ball	Feeders had new free-wheeling unit installed. Guns cleaned and checked. OK, torque before mission 375#, after mission 350#.
200	200	786	10/2	"	"	OK, torque OK
200	80	866	10/4	"	"	M1 links in belt
200	200	1066	10/4	"	"	OK, torque OK
200	200	1266	10/5	"	"	OK, torque OK
200	155	1421	10/11	"	"	Failure to extract empty round
200	50	1471	10/12	"	AP&Ball	Broken belt; broken breechblock lock replaced. Gun cleaned.
200	197	1668	10/18	HFR	Ball	Improper alignment of links.

Inclosure 2, Page 5.

C O N F I D E N T I A L

Airplane Type P-70 Airplane No. 39-736 S.T. # 2-43-91

Gun Type 20 MM Gun Serial No. 165612 Installation Right Inboard

Rounds Loaded	Rounds Fired	Total To Date	Date	Armors Initial	Type Ammo. Lot. No.	Remarks; Give complete information, mission-malfunction, parts replaced, etc.
200	200	1868	10/22	HFR	Ball	OK
200	200	2068	10/24	"	"	OK
200	112	2180	10/28	RHB	"	OK, pilot stopped firing
200	200	2380	10/30	"	"	OK
200	200	2580	10/30	"	"	OK
200	114	2694	10/30	"	"	Broken firing pin
200	200	2894	11/1	"	"	OK
200	25	2919	11/2	"	"	Safety wire on ejector studs broken. Ejector loose.
200	200	3119	11/2	"	"	OK, new gas cylinder vent plug installed.

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GUN HISTORY RECORD

Airplane Type P-70 Airplane No. 39-736 S.T. # 2-43-91

Gun Type 20 MM Gun Serial Number 165615 Installation Left Inboard

Rounds Loaded	Rounds Fired	Total To Date	Date	Armorers Initial	Type Amm. Lot. No.	Remarks (Give complete information, such as malfunction, parts replaced, etc.
						Previous rounds fired - 730
138	38	38	9/18	RHB	AP	Failure to align. Rounds out of line in belt. Guns cleaned and checked. (Link chutes aligned in Sub-Depot)
200	169	207	9/22	"	Ball	Broken firing pin. New type firing pin installed.
200	35	242	9/23	"	"	Link jam.
200	200	442	9/24	"	AP & Ball	OK, Torque OK
200	200	642	9/25	"	AP	OK, torque before mission 400#, after mission 375#. / Feeder had new free-wheeling unit installed. / Guns cleaned and checked.
200	200	842	10/2	"	Ball	OK, Torque OK
200	103	945	10/4	"	"	Link jam
200	200	1145	10/4	"	"	OK, Torque OK
200	200	1345	10/5	"	"	OK, Torque OK
200	200	1545	10/11	"	"	OK, Torque OK
200	70	1615	10/12	"	AP & Ball	M1 links in belt. Guns cleaned and checked. Cracked breechblock lock replaced.

Inclosure 2, Page 7.

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GUN HISTORY RECORD

Airplane Type P-70 Airplane No. 39-736 S. T. # 2-43-91

Gun Type 20 MM Gun Serial No. 165615 Installation Left Inboard

Rounds Loaded	Rounds Fired	Total To Date	Date	Armors Initial	Type Ammo. Lot No.	Remarks; Give complete information, mission-malfunction, parts replaced, etc.
200	200	1815	10/18	HFR	Ball	OK
200	94	1909	10/22	"	"	Operating lever of feeder out of yoke (no apparent reason)
200	200	2109	10/24	"	"	OK. Door cover bracket repaired
200	112	2221	10/28	RHB	"	OK. Pilot stopped firing
200	50	2271	10/30	"	"	Operating lever out of yoke. Feed run down (no apparent reason)
200	200	2471	10/30	"	"	OK. Replaced cracked breechblock lock
200	78	2549	10/30	"	"	Operating lever out of yoke. Feed run down (no apparent reason)
200	173	2722	11/1	"	"	Failure to extract due to burr on cartridge and weak extractor spring. Replaced extractor and extractor spring.
200	40	2762	11/2	"	"	Inert round in belt. No powder in cartridge.
200	100	2862	11/2	"	"	Operating lever out of yoke. Feeder run down (no apparent reason) New gas cylinder vent plug installed.

Summary of Firing After Modifications Accomplished as described in paragraph 6 b

Total gun missions	64
Total gun missions fired out	41
Total stoppages	23
Total rounds loaded	15500 (1000 - A.P. & Ball; 14500 - Ball)
Total rounds fired	12499 (720 - A.P. & Ball; 11779 - Ball)
Percent rounds fired	80.6%
Total rounds not fired	3001
Percent rounds not fired	19.4%
Rounds not fired due to feeder	825
Percent rounds not fired due to feeder	5.3%
Rounds not fired due to gun	738
Percent not fired due to gun	4.7%
Rounds not fired due to ammunition	160
Percent not fired due to ammunition	1.1%
Rounds not fired due to maintenance & misc.	1278
Percent not fired due to maintenance & misc.	8.3%

Number, Type and Rounds Not Fired Due To Stoppages

Feeder Stoppages

2 - Link jams	347
4 - Operating lever out of yoke	478
6	825

Gun Stoppages

2 - Broken firing pin	361
2 - Failure to extract	227
1 - Broken magazine slide screw	150
5	738

Ammunition Stoppages

1 - Inert round	160

Maintenance & Miscellaneous Stoppages

3 - M-1 Link in belt	324
2 - Failure to align	9
2 - Weak link	300
1 - Broken belt	150
1 - Failure to safety ejector	175
1 - Bent link	295
1 - Burred round	25
11	1278

Summary of Firing Before Modifications Accomplished as described in paragraph 6 b

Total gun missions	20	
Total gun missions fired out	6	
Total stoppages	14	
Total rounds loaded	4743	(943 - A.P. (1000 - A.P. & Ball (2800 - Ball
Total rounds fired	2393	(541 - A.P. (733 - A.P. & Ball (1119 - Ball
Percent rounds fired	50.1%	
Total rounds not fired	2350	
Percent rounds not fired	49.9%	
Rounds not fired due to feeder	1070	
Percent not fired due to feeder	22.6%	
Rounds not fired due to gun	326	
Percent not fired due to gun	6.9%	
Rounds not fired due to ammunition	102	
Percent not fired due to ammunition	2.2%	
Rounds not fired due to maintenance & misc.	852	
Percent not fired due to maintenenace & misc.	18.2%	

Number, Type and Rounds Not Fired Due to Stoppages

Feeder Stoppages		Gun Stoppages	
4 - Feeder run down	905	1 - Broken driving spring	295
1 - Link jam	165	1 - Broken firing pin	31
5	1070	2	326

Ammunition Stoppages		Maintenenace & Miscellaneous Stoppages	
1 - Light struck primer	102	3 - Failure to align	455
		1 - Loose mount	130
		1 - Weak link	112
		1 - Link chute out of position	155
		6	852

COMPONENT PARTS BREAKAGE RECORD

	Rounds Fired	Still Firing	Caused Stoppage	Did not cause Stoppage
Left Outboard Gun #165610	4258			
Standard firing pin changed after	230			X
1st replacement new type firing pin broke after	3128		X	
2nd replacement new type firing pin	900	X		X
Original driving spring failed after	230		X	
1st replacement driving spring fired	4028	X		X
Original breechblock lock cracked at	2245			X
1st replacement breechblock lock	2013 (not cracked)			X
Original firing pin slot bolt failed at	3358			X
Right Outboard Gun # 165616	4701			
Standard firing pin changed after	170			X
1st replacement type firing pin fired	4531	X		X
Original breechblock lock cracked after	2195			X
1st replacement breechblock lock cracked after	1456			X
2nd replacement breechblock lock fired	1050 (not cracked)			X
Original driving spring broken after	2613			X
1st replacement driving spring replaced after firing	1038			X
2nd replacement driving spring replaced after firing	1050	X		X

	Rounds Fired	Still Firing	Caused Stoppage	Did not cause Stoppage
Right Outboard Gun #165616 - Cont'd				
Original extractor spring broken after	2613		X	
1st replacement extractor spring	2088	X		X
Original rear buffer assembly	3651			X
1st replacement rear buffer assembly	1050	X		X
Original retainer pin broken	3651			X
1st replacement retainer pin	1050	X		X
Original magazine slide securing arm screw broken after firing	4401		X	
1st replacement magazine slide securing arm screw	300	X		X
Original gas cylinder sleeve spring broken	4701			X
Right Inboard Gun #165612	3119			
Standard firing pin changed after firing	98			X
1st replacement new type firing pin fired	2592		X	
2nd replacement new type firing pin fired	425	X		X
Original breechblock lock cracked after	1471			X
1st replacement breechblock lock fired	1648	X		X

	Rounds Fired	Still Firing	Caused Stoppage	Did not cause Stoppage
Left Inboard Gun #165615	2862			
Standard firing pin changed after firing	207			X
1st replacement new type firing pin fired	2655	X		X
Original breechblock lock cracked after	1615			X
1st replacement breechblock lock cracked after	856			X
2nd replacement breechblock lock fired	391	X		X
Replaced original extractor and extractor spring after firing	2722		X	
1st replacement extractor and extractor spring fired	140	X		

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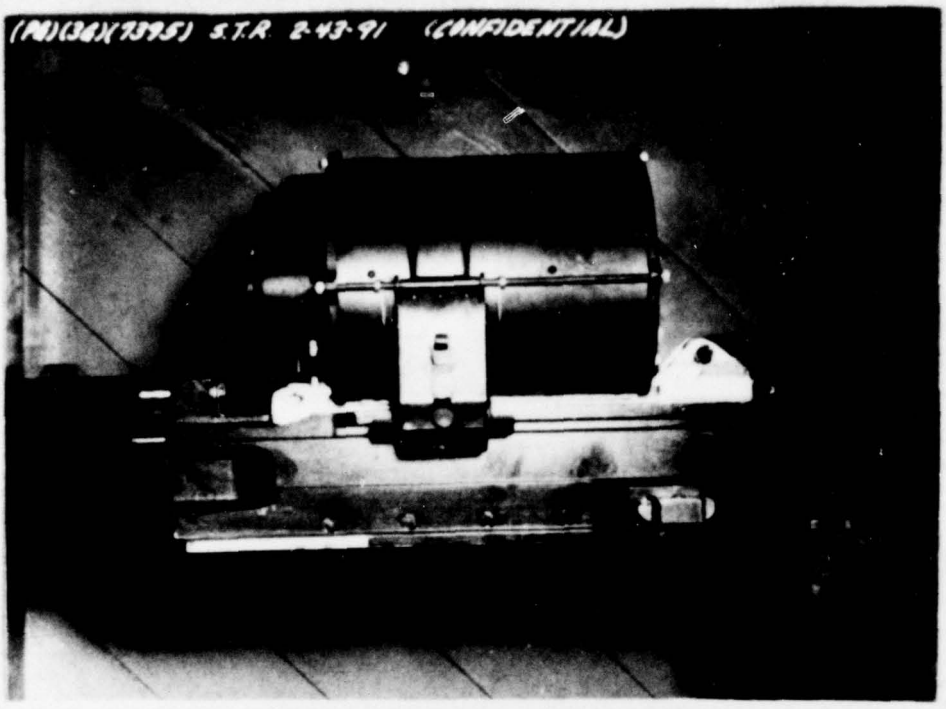
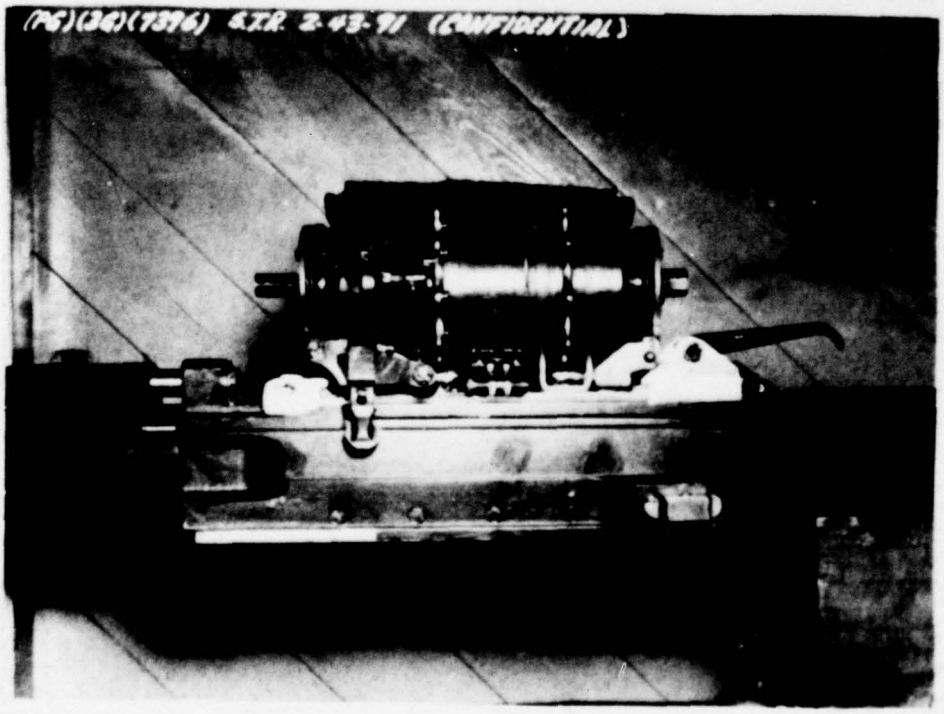


Side view of Standard AN-M1 feeder.

These two (2) photographs show the contrast in size of the AN-M1 and T-14 feeders.



Side view of T-14 feeder.

Inclosure 7.

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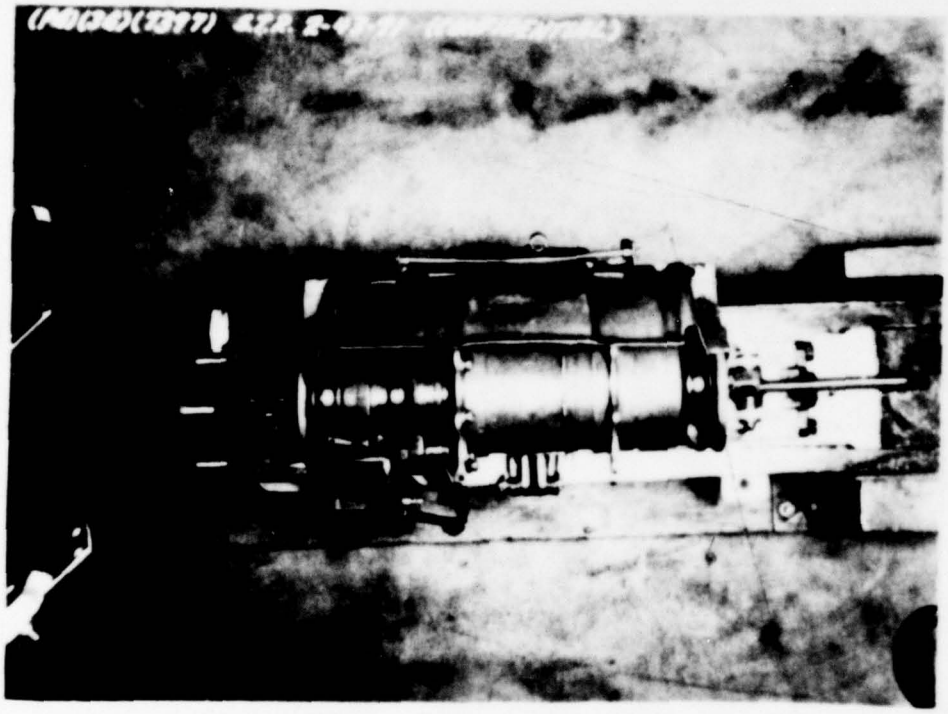
Top view of AN-M1 feeder.

These two (2) photographs show the contrast in size of the AN-M1 and T-14 feeders.



Top view of T-14 feeder.

Inclosure 8.